

REMARKS

In the Office Action, the Examiner rejected claims 1-9, 12-20, and 22-47. The claim rejections are fully traversed below. The claims have been amended to further clarify the subject matter regarded as the invention. In addition, claims 5-6, 8-9, 15-17, 19-20, 30, 31, 33, 34, and 46 have been cancelled due to incorporation of the limitations in the independent claims. Claims 1-4, 7, 12-14, 18, 22-29, 32, 35-45, and 47 remain pending.

Reconsideration of the application is respectfully requested.

REJECTION OF CLAIMS UNDER 35 USC §103

In the Office Action, the Examiner rejected claims 1-10 and 12-47 under 35 USC §103 as being unpatentable over the admitted prior art in view of RFC 2139, ('RFC 2139' hereinafter) and Rai et al, U.S. Patent No. 6,377,982 ('Rai' hereinafter). This rejection is fully traversed below in view of the above claim amendments.

As described in the Background section of Applicant's specification, the Mobile IP Management Information Base (MIB) defines a set of variables that can be examined or configured by a manager station. This accounting information is typically stored on the corresponding network device (e.g., Home Agent or Foreign Agent) and therefore each network device may be periodically examined by the manager station. In other words, storage and updating of accounting information is typically dispersed among the network devices rather than stored at a centralized server. Although this information may be periodically polled by the manager station, this process is not dynamically performed (e.g., by a Home Agent or Foreign Agent). Moreover, such variables have not been implemented for the purposes of billing users associated with these mobile nodes. See Background section, pp. 3-4.

In accordance with various embodiments of the invention as claimed in claim 1, an accounting request is sent to a centralized server by a network device (e.g., Home Agent or a

Foreign Agent) to update accounting information associated with the mobile node. Since this information is centralized, it is possible to generate bills for a mobile node using the accounting information. The cited art, separately or in combination, neither discloses nor suggests the claimed invention. For instance, the cited art neither discloses nor suggests the use of a server that can receive accounting requests from various network devices (e.g., Home Agents and/or Foreign Agents) in order to record accounting information associated with various mobile nodes. In fact, the cited art discloses a system in which information stored at a network device such as a Home Agent or Foreign Agent is polled periodically.

The Examiner seeks to cure the deficiencies of the primary reference with Rai. Specifically, the Examiner cites col. 2, lines 63-67 and col. 3, lines 1-6 and 12-16 of Rai. Rai does disclose a foreign accounting collection module and a home accounting collection module. See col. 2, lines 63-67. Specifically, the home and serving accounting collection modules collect accounting data on message traffic transported between the end system and a communications server. See col. 3, lines 12-17. However, Rai neither discloses nor suggests maintaining accounting information for mobile nodes supported by a plurality of Home Agents. Moreover, Rai neither discloses nor suggests the type of data collected by the accounting collection modules, or the manner in which that information is sent to the accounting server, as claimed. In fact, Rai indicates that the accounting server is located in the home network. See col. 16, lines 4-16 and FIGs. 14 and 24. As a result, Rai teaches away from an accounting server that supports a plurality of Home Agents.

Accordingly, the cited art teaches away from the use of a system in which information is centralized at a server and updated through the use of accounting requests sent by network devices such as Home Agents and Foreign Agents in association with various Mobile Nodes supported by multiple Home Agents. Moreover, since the admitted prior art and Rai teaches accounting information distributed among Home Agents or Foreign Agents rather than centralized at a server supporting multiple Home Agents, the prior art teaches away from maintaining accounting information for a plurality of Home Agents at a central server as recited in claim 1, for example.

With respect to claims 1, 3, 10, 13, 23, 27, 37, and 39, the Examiner admits that the admitted prior art neither discloses nor suggests sending an accounting request including at least one counter to a server adapted for recording accounting information associated with the mobile node. The Examiner seeks to cure the deficiencies of the admitted prior art with RFC

2139, referring to page 8, section 4.2 Accounting-Response. However, while RFC 2139 teaches an accounting response and reply that are sent between a RADIUS accounting server and a client, RFC 2139 neither discloses nor suggests communicating with a Home Agent or Foreign Agent to dynamically update accounting information associated with a mobile node. Accordingly, it is respectfully submitted that the Examiner has failed to prove a prima facie case of obviousness. Accordingly, it is submitted that claims 1, 3, 10, 13, 23, 27, 37, and 39 are patentable over the cited references.

The Examiner admits that the admitted prior art neither discloses nor suggests that the counter indicates a number of packets received by the mobile node or a number of packets sent from the mobile node. Again, the Examiner refers to RFC 2139, stating that the reference teaches a counter that indicates a number of packets and number of bytes received and sent to the mobile node. Applicant respectfully traverses this assertion. Specifically, the cited portion (page 9, lines 10-15 of RFC 2139) merely refer to RADIUS attributes, and the use of an accounting request marking the beginning of the user service (start) or the end (stop), as referred to on page 4, line 28 – page 5, line 8 of the Background section of Applicant's specification. As disclosed in the Background section of Applicant's specification, a time stamp such as a START and STOP time stamp is not easily implemented in a Mobile IP environment, since each mobile node may roam to numerous Foreign Agents while communicating with a given corresponding node. Moreover, RFC 2139 neither discloses nor suggests using a specific counter indicating a number of packets or bytes received or sent by the mobile node. Rai fails to cure the deficiencies of the primary references. Accordingly, the prior art teaches away from a system in which accounting requests are used to update accounting information at a central server in a Mobile IP environment. Accordingly, Applicant respectfully submits that claims are patentable over the cited references.

With respect to claims 4, 26, 28, 38, and 40, the Examiner admits that the admitted prior art fails to teach that the accounting reply acknowledges logging of accounting information pertaining to the mobile node, and refers to RFC 2139. For the reasons set forth above, the cited art, separately or in combination, neither discloses nor suggests the logging of accounting information in a Mobile IP environment in response to an accounting request from a Home Agent or a Foreign Agent. Accordingly, Applicant respectfully asserts that claims 4, 26, 28, 38, and 40 are patentable over the prior art.

The claimed invention enables an accounting request to be sent under various circumstances (e.g., after a specific number of packets have been sent or received by a mobile node) where the accounting request includes at least one counter, indicating at least one of a number of packets or bytes sent or received by the mobile node, or a total service time. In this manner, a bill may be generated for this period of time or amount of information transmitted.

The dependent claims depend from one of the independent claims and are therefore patentable over the admitted prior art in view of the cited art for at least the same reasons. However, the dependent claims recite additional limitations that further distinguish them from the cited references. Hence, it is submitted that the dependent claims are patentable over the cited art.

Based on the foregoing, it is submitted that the independent claims are patentable over the cited references. In addition, it is submitted that the dependent claims are also patentable for at least the same reasons. The additional limitations recited in the independent claims or the dependent claims are not further discussed as the above discussed limitations are clearly sufficient to distinguish the claimed invention from the admitted prior art and the Mobile IP reference. Thus, it is respectfully requested that the Examiner withdraw the rejection of the claims under 35 USC §103(a).

SUMMARY

Reconsideration of the application and an early Notice of Allowance are earnestly solicited. If there are any issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for an extension of time which may be required to maintain the pendency of this case, and any required fee for such extension or any further fee required in connection with the filing of this Amendment is to be charged to Deposit Account No. 50-0388 (Order No. CISC077)

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MARKED UP COPY OF THE CLAIMS

1. (Three Times Amended) A network device which supports Mobile IP and is configured to send an accounting request, the accounting request identifying a mobile node, the network device comprising:

a memory; and

a processor coupled to the memory, wherein the network device is adapted for updating a counter associated with the mobile node's activity, the network device adapted for sending the accounting request identifying the mobile node and including the counter to a server in response to a trigger event, the trigger event being a lapse of a predetermined period of time, initiation or termination of a registration of the mobile node, or when a number of packets are received or sent by the mobile node, the server being adapted for recording accounting information associated with the mobile node using the counter, the network device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed, wherein the server maintains accounting information for a plurality of mobile nodes supported by a plurality of Home Agents, the accounting information being [, the plurality of mobile nodes being supported by] received from a plurality of network devices, each of the plurality of network devices being a Home Agent or a Foreign Agent adapted for sending an accounting request to the server to update accounting information associated with a mobile node in response to a trigger event, the trigger event being a lapse of a predetermined period of time, initiation or termination of a registration of one of the plurality of mobile nodes, or when a number of packets are received or sent by one of the plurality of mobile nodes.

2. (Once Amended) The network device as recited in claim 1, wherein the counter indicates at least one of a number of packets received by the mobile node [and], a number of packets sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node.

3. (Twice Amended) A server in communication with a plurality of network devices supporting Mobile IP and configured to receive an accounting request from [a network device] one of the plurality of network devices which supports Mobile IP, each of the plurality of network devices being a Home Agent or a Foreign Agent, the accounting request identifying a mobile node, the server comprising:

a memory; and

a processor coupled to the memory, wherein the server is adapted for storing accounting information for a plurality of mobile nodes and logging accounting information associated with the mobile node in response to the accounting request received from the network device, the network device being a Home Agent or a Foreign Agent, the accounting request including at least one counter associated with the accounting information, the plurality of mobile nodes being supported by a plurality of Home Agents [network devices, each of the plurality of network devices being a Home Agent or a Foreign Agent], the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node.

4. The server as recited in claim 3, wherein the server is adapted for sending an accounting reply to the network device in response to the accounting request, the accounting reply acknowledging logging of the accounting information pertaining to the mobile node.

7. The server as recited in claim 3, wherein the counter indicates a number of registrations that have been accepted.

12. The server as recited in claim 3, wherein the server is a TACACS+ or a RADIUS server.

13. (Three Times Amended) In a network device which supports Mobile IP, a method of updating accounting information for a mobile node operating according to Mobile IP Protocol, comprising:

composing a request packet for the mobile node in response to a trigger event, the trigger event being a lapse of a predetermined period of time, initiation or termination of a registration of the mobile node, or when a number of packets are received or sent by the

mobile node, the request packet identifying the mobile node and including at least one counter associated with accounting information pertaining to the mobile node; and

sending the request packet to a server adapted for performing accounting for the identified mobile node using the at least one counter in response to the request packet, the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node, the network device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed.

14. (Once Amended) The method as recited in claim 13, further comprising:

receiving a reply packet for the mobile node identified in the request packet from the server, the reply packet acknowledging logging of the accounting information pertaining to the mobile node.

18. The method as recited in claim 13, wherein the counter indicates a number of registrations that have been accepted.

22. The method as recited in claim 13, wherein the server is a TACACS+ or a RADIUS server.

23. (Once Amended) The method as recited in claim 13, further comprising:

receiving a data packet from the mobile node, wherein composing the request packet is performed in response to receiving the data packet.

24. (Once Amended) The method as recited in claim 23, further comprising:

forwarding the data packet to another network device.

27. The method of claim 13, wherein composing a request packet for the mobile node is triggered by an accounting event.

26. The method of claim 25, wherein the accounting event is a new registration or the termination of a registration.

27. (Three Times Amended) In a server, a method of updating accounting information for a mobile node operating according to Mobile IP Protocol, comprising:

receiving a request packet from a network device operating under Mobile IP Protocol, the request packet identifying the mobile node and including at least one counter associated with accounting information pertaining to the mobile node, the network device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed, the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node; and

logging the accounting information for the mobile node identified in the request packet using the at least one counter of the request packet.

28. (Once Amended) The method as recited in claim 27, further comprising:

sending a reply packet for the mobile node identified in the request packet, the reply packet acknowledging logging of the accounting information pertaining to the mobile node.

29. (Once Amended) The method as recited in claim 27, further comprising:

generating a bill for Mobile IP services from the accounting information.

32. The method as recited in claim 27, wherein the counter indicates a number of registrations that have been accepted.

36. The method as recited in claim 27, wherein the server is a TACACS+ or a RADIUS server.

37. (Three Times Amended) A computer-readable medium having thereon computer readable instructions for updating accounting information for a mobile node in a network device, the instructions comprising:

instructions for composing a request packet for the mobile node in response to a trigger event, the trigger event being a lapse of a predetermined period of time, initiation or termination of a registration of the mobile node, or when a number of packets are received or sent by the mobile node, the request packet identifying the mobile node and including at least one counter associated with accounting information pertaining to the mobile node; and

instructions for sending the request packet to a server adapted for performing accounting for the identified mobile node using the at least one counter in response to the request packet, the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node, the network

device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed.

38. (Once Amended) The computer-readable medium as recited in claim 37, further comprising:

instructions for receiving a reply packet for the mobile node identified in the request packet, the reply packet acknowledging logging of the accounting information for the mobile node.

39. (Twice Amended) A computer-readable medium having thereon computer readable instructions for updating accounting information for a mobile node, the instructions comprising:

instructions for receiving a request packet from a network device operating under Mobile IP Protocol, the request packet identifying the mobile node and including at least one counter associated with accounting information pertaining to the mobile node, the network device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed, the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node; and

instructions for logging the accounting information for the mobile node using the at least one counter.

40. (Twice Amended) The computer-readable medium as recited in claim 39, further comprising:

instructions for sending a reply packet for the mobile node identified in the request packet, the reply packet acknowledging logging of the accounting information for the mobile node.

41. The network device as recited in claim 1, wherein the network device is adapted for sending the accounting request including the counter to the server when a packet is sent by the mobile node or received by the mobile node.

42. The network device as recited in claim 1, wherein the accounting request further includes a value associated with the counter.

43. The network device as recited in claim 2, wherein the packets received by the mobile node and sent by the mobile node are intercepted by the network device.

44. The server as recited in claim 3, wherein the accounting request further includes a value associated with the counter.

45. (Once Amended) The server as recited in claim [8] 3, wherein the total service time is a total of one or more registration lifetimes for the mobile node.

47. (Twice Amended) A network device which supports Mobile IP and adapted for updating accounting information for a mobile node operating according to Mobile IP Protocol in a network device, comprising:

means for composing a request packet for the mobile node in response to a trigger event, the trigger event being a lapse of a predetermined period of time, initiation or termination of a registration of the mobile node, or when a number of packets are received or sent by the mobile node, the request packet identifying the mobile node and including at least one counter associated with accounting information pertaining to the mobile node; and

means for sending the request packet to a server adapted for performing accounting for the identified mobile node using the at least one counter in response to the request packet, the at least one counter indicating at least one of a number of packets that have been sent to the mobile node, a number of packets that have been sent from the mobile node, a total service time for the mobile node, a number of bytes that have been sent to the mobile node and a number of bytes that have been sent from the mobile node, the network device being a Home Agent supporting the mobile node or a Foreign Agent to which the mobile node has roamed.